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ABSTRACT

Interest or motivation, intelligence and experience, and psychosocial access are inextricably bound together in successful educational programs, and none can explain or predict performance by itself. In the realm of interest and motivation, it has been found that youth want to learn how to be effective, like to do the things their parents value, and have almost universal interest in science and mathematics because of natural curiosity about the world. Intelligence is defined as what children do with what they know, the interaction of repertoire and capacity. Understanding of the difference between repertoire and capacity clarifies the distinction between intellectual ability and academic performance. The purpose of educational program design should be to facilitate development of repertoire using the child's natural interest in how the world works. Access can take a variety of forms, including exposure to educational and quasi-educational experiences and ability to communicate in the classroom, and expectations about access can strongly influence academic success. Teachers can begin to address the diversity in a classroom and move all students in the same direction with cooperative or group work, and the primary responsibility of the teacher and aide is to focus the student's perception on the task's essential features. In addition, students must learn to take responsibility for learning. (MSE)

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Motivation, Intelligence, and Access: A Theoretical Framework for the Education of Minority Language Students

Edward De Avila

Over the past 15 years our research and experience have suggested three factors as important in understanding individual success in school: (1) interest and motivation; (2) intelligence and experience; and (3) psycho-social access. Our purpose here is not to fully explain all academic performance or school-related behavior but rather to set the stage for a description of our approach to program development and implementation by providing a theoretical framework. We will argue that each of the three factors is critical for a full understanding. However, viewed in isolation each is insufficient either to explain or to predict performance. Academic excellence results from the combination of the three.

Interest and Motivation

There has been a great deal written on academic motivation and interest and the role of personality factors as they affect performance in school. For years it was thought that underachieving students were simply not motivated to achieve. The assumption was that the students were motivated along the same dimensions and that the problem faced by educators was simply a matter of "motivating" underachieving students. In a more recent view, low achieving students (particularly minority language students) have been characterized as having cognitive structures with important gaps in fundamental knowledge. Typically, these students are seen as being handicapped in language development with parents who are poor language models and who do not value or encourage intellectual development. Although many psychological, sociological, and anthropological views have added to our understanding of how cultural and/or personality differences may influence school behavior, these views have also, unfortunately, contributed to ethnic stereotyping by con-

fusing individual with group differences. The most objectionable part of a stereotype is the belief that the stereotype applies to all members of the group and represents inborn unalterable traits.

For a variety of methodological and theoretical reasons, findings from recent investigations have led us to reject virtually all of these conceptualizations. Moreover, on purely practical grounds, explanations based on "poor self-concept" and "low achievement motivation" and the like have done little to improve the design and/or delivery of educational instruction for ethnolinguistically different students. Our research seems to show that although concepts such as self-concept, impulsivity, and other constructs globally defined as *cognitive style* have not been particularly useful at a group level, it does seem reasonable to talk about the characteristics of successful students without reference to possible differences associated with ethnolinguistic group membership.

An experiment using games, described by McClaland, Atkinson, Clark, and Lowell (1953), along with the results from many other studies, have been interpreted as suggesting that while successful behavior is motivated by the wish to win and a corresponding belief in the possibility of winning, a good deal of unsuccessful behavior is motivated by the wish to avoid possible failure. Thus, the unsuccessful student picks tasks or targets which are virtually out of reach or so easy as to be trivial. In either case there is no real challenge or risk. Moreover, there is little in the way of academically valued accomplishment.

Learning implies an element of risk regardless of content. Repeated failure or difficulty in school lowers interest in academic subject matter as well as expectation for future success. Academic performance, however, does not seem to be fully explained by motivational factors alone. Simply wanting to achieve does not guarantee success. Motivation is a necessary prerequisite, but it is not sufficient.

Program design. In our attempt to develop viable programs for minority language students we began by asking, what kinds of things do children between the ages of 3 and 12 like to do? Similarly, what kinds of things found in the popular culture carry an educational value across different developmental and interest levels? Consider interest first. The research on children's interests is fairly clear. Children like to do things that help them gain a sense of mastery over their environment. About 25 years ago Robert White (1959) called this intrinsic need *effectance.* Human beings spend the major portion of their youth attempting to learn how to be effective. The role of education, whether it be in the home or the school, is one of assisting in the process.

Children also like to do the things their parents value. The extent to which parents value a given behavior or attitude is indicated to the child by the extent to which parents engage in it. Our search for an approach to facilitate the development of effective children in both home and school

leads to the more general question of what kinds of things are of value to parents and of interest to children regardless of linguistic, cultural, and geographic differences.

The above consideration has led us to conclude that some of the most universally held interests are to be found in the areas of science and mathematics. In this sense probably all children have wondered about where the sun goes on a rainy day or why things always fall down. Not only do science and math offer educationally meaningful content, they offer a perfect context in which to facilitate the development of higher order thinking skills.

Intelligence and Development

Intelligence is typically thought of as a score on an intelligence test. It is often expressed in terms of an I.Q. score. In the past, this number or I.Q. value was thought to be indicative of the raw or innate, and thus fixed, capacity of a person to achieve. Over the years correlational studies were used to show that I.Q. was a useful concept in predicting academic success and a handy device for explaining the low academic performance of a good many students, particularly minority students.

More recent research and theorizing have suggested that not only is the concept of fixed intelligence, defined as I.Q., socially egregious, but that intelligence tests measure a good deal more than simple innate capacity. In fact, the I.Q. controversy has led some to conclude that the concept is of little value. Nevertheless, research has clearly shown that there are individual differences between students, and it would make little sense to try to teach subjects to children who are neither developmentally ready nor intellectually able to learn them.

In an attempt to take advantage of what is known about how children mature intellectually, we have taken an approach that borrows from recent work in cognitive psychology, particularly information processing theory. By integrating this work with some of Piaget's developmental notions, we arrive at a definition of intelligence that is particularly well suited to handle the social, psychological, linguistic, and educational diversity.

We define intelligence as *what children can do with what they know.* Defined in this way there are two aspects that are important in determining a child's level of intellectual development. The first is what a child *knows* and brings to the educational setting, and the second is what the child *can do* with this knowledge. In a limited sense, intelligent behavior results from the interaction of the child's repertoire and capacity.

By *repertoire* we refer to all of those things a child brings to the educational setting. This includes his or her language and culture, an understanding of the social demands of the classroom and/or test situation, as

well as a host of other skills typically associated with family background. Children's repertoires are thus the machinery that runs their intellectual mills. Children with a very rich or elaborate repertoire are not necessarily more intelligent but are simply in a better position to behave intelligently simply because they have a greater number of strategies (intellectual as well as social) with which to approach a task. If, for example, a child comes from a home where English is not spoken, there is a good chance that the child has not learned sufficient English to deal with much of the test's content. As a consequence, it is virtually impossible to tell if the child has missed a test question because the child does not know or understand the concept or because the student does not possess sufficient skill to either understand the instructions or complete the task. Ostensibly, our position is that one of the major purposes of education is to facilitate the development of generalizable strategies which will serve the student regardless of background characteristics.

Appreciation of the fact that children come from diverse backgrounds leads to a recognition of the problem that children from different environments cannot be compared since they possess different repertoires. If intelligence is what children can do with what they know, and if children come from different and sometimes radically diverse backgrounds, then how is comparison across children possible? In a series of experiments conducted over the past fifteen years in Canada, Mexico, and the United States, we have found that when the effects of prior experience (i.e., repertoire) are controlled through the use of pretraining procedures, many of the differences between ethnolinguistic groups in intellectual ability seem to disappear. In other words, ethnolinguistic group differences in intellectual ability reported in the literature are largely a function of *repertoire differences and not intelligence per se* (De Avila 1976; De Avila and Duncan 1980).

Consideration of the differences between repertoire and capacity leads to an understanding of the important distinction between intellectual ability and school achievement. The poor academic showing of many minority language and other students, coupled with the results of the above studies, gives testimony to the fact that while intelligence is a necessary condition for achievement, it alone cannot be considered as sufficient.

Program design. Our overriding purpose is to design programs that facilitate cognitive functioning and thereby improve academic performance. In other words, our purpose is to facilitate the development or acquisition of intellectual strategies (i.e., increase the repertoire) that have applicability in a variety of educational and other contexts. We approach this task by taking children's natural interest in how the world works and focusing on mathematical and scientific processes. In so doing we consider the difference between the facts, labels, and names encountered in

science and the concepts and intellectual processes underlying them or their use. In this sense we would distinguish between the word and its meaning, or between the label for an object and its function; labels vary, functions do not.

In the following discussion, contrasts and comparisons are made between two types of learning, both of which are necessary in the educational process. The first type of learning involves primarily memory work, as is involved in learning a list of words. The best way to learn in this way is through repetition, drill, and practice; there is simply no other efficient way. The second type of learning, concept learning, exhibits an important difference and is best understood through a description of a concept formation task. Historically, concept formation has been studied in the laboratory since the nineteenth century under various names, including insight, inference, and problem solving. From our point of view the important thing to remember is that the common element of these tasks is that they all demonstrate the principles of how thinking skills are developed.

We use Harlow's (1949) concept of the learning set to explain the process of forming or acquiring a thinking skill. In a typical learning set experiment, (called an oddity problem), the child is presented with a set of objects (e.g., three red wooden shapes, two of which are rectangular and one triangular). The child is asked to identify the one that is different and is rewarded if she or he makes the correct identification. If the child fails to make the correct identification, the shapes are simply removed and presented again in a different configuration. In the process of repetition each presentation differs slightly from the former along some irrelevant dimension. In a memorization task, on the other hand, the child simply keeps repeating the same thing over and over. In forming a concept, thinking skill, or learning set, reach repetition involves some slight difference. During the process of repetition the children come to form a concept that enables them to distinguish the relevant from the irrelevant features of the situation or stimulus, because the concept remains invariant.

What researchers have found is that concepts that are formed in this manner are highly stable across time and situations. In other words, once a concept is learned, the student attempts to use the concept to solve other problems which, from the student's point of view, appear to be similar. Thus the concept becomes a strategy for dealing with new situations.

A dramatic example of real-life learning-set formation is offered by Hunt (1961) in his description of Helen Keller. Both blind and deaf since her first year of life, Helen did not hit upon the generalization that "things have names" until the critical water-pump incident in her eighth year. There are several aspects of Helen's insight or discovery which have a

bearing on our approach. First, it is important to note that Helen's understanding of the idea that "things have names" did not occur in an incremental fashion. While there were numerous exposures to the concept, her insight took place all at once. What this means at the practical level is that we can never tell exactly when the insight will take place or exactly what kind of task will trigger it. To allow for such insights, our approach embeds concepts in interesting tasks that vary along "irrelevant dimensions" while the principle of solution remains invariant. Second, by virtue of our approach to concept repetition, differences between students become an asset to instruction as opposed to a hindrance. Exposure to varying points of view is just like a learning-set task or experiment. In this case, language can become an irrelevant dimension, and the need to discuss task demands in different languages inevitably leads to a focus on deeper meaning as opposed to labels, since labels differ between languages whereas concepts in science and math do not. Third, Helen's insight was driven by a need to communicate. Similarly, children's learning is usually pragmatic. They learn the things they want to learn in order to accomplish some end.

This distinction between means and ends is often confused in the educational process, particularly in compensatory approaches to remediation of basic skills where skills development becomes an end in itself. Children find themselves filling out endless dittos with little understanding of why. In minority language programs where the avowed purpose is to teach English, non-English-speaking students learn endless lists of isolated words for no apparent purpose other than to satisfy the teacher. The result is inevitable—students learn rote skills such as those found in decoding or computation with little real understanding as to how to apply them as a strategy for learning.

In our program basic skills development is one of our primary objectives; however, the acquisition process always takes place in the context of science and math tasks. In this way we introduce various aspects of language, reading, and arithmetic from within the tasks themselves. The skills are never introduced in isolation or out of the context in which they serve an explicit purpose. In this way children come to appreciate their means-ends relation; they learn to read, measure, calculate, record, estimate, and write so that they can do interesting things.

Fourth and finally, one of the most compelling aspects of Helen Keller's education was the extent of her effort. Her discovery at the water pump involved intellect and body alike and clearly illustrates the importance of the relation between learning and motoric involvement (muscle tension), a relationship clearly demonstrated by Held and Hein (1963), among others. Motor involvement is facilitated in our program by using tasks requiring manipulation of concrete objects, thus promoting active, not

passive, learning. This use of concrete objects also facilitates cross-model multiple presentation which is consonant with learning-set methodology.

Access

Educational access is associated with the concept of educational equity. In fact, it is embedded in the very definition of educational equity as described in the Civil Rights Act of 1964 which guarantees "equal access to educational opportunity." The assumption has generally been made that access and opportunity are synonymous as long as students are instructed at the same location (ideally, in integrated classrooms). More recent discussion by De Avila and De Los Santos (1979), however, has suggested that in the education of minority language populations one must rethink the concept of educational equity insofar as one must consider not only *where* students receive instruction, but *how* the instruction is delivered and received.

Access, as we view the term, can be discussed in several ways, including from linguistic, psychological, and sociological perspectives. At the most general level, access can be thought of in terms of socioeconomic status (SES). In other words, by the simple fact of coming from a family of high SES, some children are exposed to educational and quasi-educational experiences that have a beneficial impact on education and intellectual performance.

To fully understand our approach to the concept of access as it applies to the psychological aspects of educational performance, it is important to bear in mind that at the classroom level there is a difference between learning or memorizing a list of names or numerical equivalences and forming concepts about previously unknown relationships. Our position is that compensatory programs have tended to emphasize the former at the expense of the latter, and that this emphasis constitutes a denial of access. The assumptions underlying this tendency are that deficiencies must first be remediated and that children need to know their facts before taking on more abstract material. These assumptions are particularly evident in the case of minority language students where proficiency in English is used as a prerequisite to participation in classes involving more complex material. The inevitable result is continued failure since programs emphasizing rote skills tend neither to be at levels commensurate with student's levels of development nor to be interesting in a personal sense.

Our thesis is not that memory work is unimportant but that all content cannot be taught in the same way, since it is not all acquired by the same processes. There is only one way to learn the names of the states; they must be memorized. Thus, memorization has its place. However, more conceptually based learning requires a different approach, one that is not particularly amenable to whole class instruction dominated by lectures or

situations emphasizing individualized seat work. Such models only further the isolation of lower achieving students.

Another type of access has to do with the student's ability to communicate in the classroom. To the extent that the student is unable to participate in oral discussion or interchange, the student is denied access, regardless of the presumption of full opportunity.

Related to this, we have found that one of the strongest predictors of academic growth or conceptual learning (as distinct from memory work) is the amount of time students spend talking and working together. The problem is that in a heterogeneous classroom centered on the teacher, there is little chance for student-student or student-teacher dialogue, especially if the teacher does not speak the child's language. Moreover, if oral English proficiency is viewed as a dimension of social status, which is more than likely the case in a linguistically heterogeneous class dominated by native English speakers, the limited- or non-English-proficient student is relegated to a lower social status within the classroom. The net result is a lowered frequency of verbal interaction, a further distancing between the limited speaker and the rest of the students, and a presumption of lower general or overall ability in the limited-English-proficient speakers.

Work by Cohen (1974) and her colleagues at Stanford on status relations between groups in the schools and on teacher expectations has shown that regardless of high intellectual capacity and motivation to do well in school, not all students have the same chances for success. Based on the theory of status characteristics and expectation states, Cohen has found that the expectations of nonminority students and teachers produce a strong self-fulfilling prophecy for failure on the part of minority language students. Moreover, Cohen has found that low achieving minority language students come to share low expectations for success with other more successful students. In other words, low achieving students become the unwitting "co-conspirators" of the self-fulfilling prophecy for failure.

Cohen's analyses, however, do not imply that children hold an overriding low self-concept. One simply has to observe the behavior of minority language students on the school playground or in the home to understand the limited nature of the concept. Cohen points out that even though teachers are able to identify the symptoms of the low self-concept child, they fail to recognize the behavior as a reaction to the expectations. Finally, Ogbu (1974) has noted that achievement motivations of minority students are much more dependent on their perceptions of the actual distribution of opportunities than upon either personality characteristics or training in the family per se.

Program design. We begin our description of how issues of access can be resolved by asking several questions. For example, what are the necessary organizational conditions for providing effective instruction in

academically, linguistically, and socially heterogeneous groups? What are the necessary roles and responsibilities underlying effective classroom organization? What kinds of classroom organizations are conducive to learning-set or concept formation? How does memory work fit in? What is the teacher's role in this kind of environment? Answers to these questions require the formulation of a complex model that is based on the cooperation of all involved, where rights, responsibilities, and roles are well delineated and tasks are orchestrated in a manner consistent with these three factors.

One of the clearest conclusions that can be drawn from the need to consider differences across students is a need for complex models of instruction. There is simply no way an individual teacher can address all of the diversity brought to the classroom by students who differ along the dimensions described above and move all these students in the same direction, without a high level of organizational skill. Organizational sociology has demonstrated that complex tasks require a high degree of cooperative group work. Cooperative group work in the classroom consists of students working together as equals, in groups small enough to accommodate the full participation of all of its members. Group and individual responsibilities are clearly understood, and students carry on their tasks without direct or immediate teacher supervision. Several immediate implications can be drawn from this definition.

Before students actually begin a program such as ours, they must first acquire the ability to work together cooperatively. In learning how to work cooperatively, students acquire a number of presocial skills that apply to almost any group task. For example, pretraining in group work leads to the ability to ask questions and help others, as well as to listen and assume responsibility for one's own behavior. Group work also requires a delegation of authority in order to be maximally effective. To some extent, delegation of authority means that students take responsibility for their own learning. The teacher's role is to focus attention on the relevant aspects of the task by asking appropriate questions without directly instructing. The teacher serves as a manager, facilitator, and resource; the students are responsible for the completion of tasks.

Students are ultimately responsible in the learning process. If they are to succeed in this connection, they must have a clear understanding of their rights, responsibilities, and roles—the three *R*s—which constitute the norms of our program (or any other program for that matter). By norms we mean rules used to govern behavior. A norm is a rule for how one ought to behave. Once learned or internalized, norms become powerful organizers in any social situation and can eliminate the need for direct discipline or direction and free the teacher to be involved in more important matters.

By far the strongest normative rule underlying the social fabric of our approach is found in the student's right to ask for help. This right does not mean, however, that students can go running to the teacher or aide at the first notice of a problem. Rather, there are channels of communication to ensure that the student's questions do not go unanswered. With rights go responsibilities. Thus, in the same way as students have the right to ask for help, they have the responsibility to help others when asked. In this way students become resources for one another in fulfilling their individual and joint needs. Roles are assigned to students as a means to make group work more efficient, to reinforce cooperative behavior, to clarify and define working relationships, and to overcome potential status distinctions. However, unlike roles in most organizations, roles in our program constantly change. All students, regardless of background, are expected to meet all of the responsibilities defining the role.

Implicit in our approach is the notion of equal status participation, and several steps are taken to ensure that status differences do not emerge. We go to great lengths to point out that everybody has something to contribute; the tasks are simply too complicated and difficult for any one person to do them all by themselves. Moreover, for a program to be successful, teachers and aides must work together in much the same way as students, as a team—the simultaneous operation of multiple learning centers is more than an individual teacher can handle.

Two aspects of the relationship between teacher and aide are critical. The first and most important aspect is the delegation of responsibility; the second has to do with the idea of feedback. Successful delegation of responsibility allows teachers to spend more time working directly with students. Mutual feedback on observed student behaviors, such as the time students spend on and off task and the amount of time spent talking and working together, and so on, allow the teacher and aide to better evaluate student progress and general classroom operations. (We use an observation form explicitly for this purpose.) The establishment of a collegial relationship between teacher and aide is essential.

In brief, the role of the teacher in our program is to facilitate the development of learning sets, and the primary responsibility of both teacher and aide is to focus the student's perceptual apparatus on the essential features of the task. This is best accomplished by asking constructive questions and providing quick feedback. The best teacher is the one who never gives the answer but always has another question. In this way the teacher guides the learning process in an unobtrusive manner. The teacher is the child's access to knowledge.

In the above, we have reviewed several issues which are important to the design and implementation of successful educational programs for minority language students. It should be readily apparent that although we have discussed interest/motivation, intelligence, and access separate-

ly, the three are inextricably bound. A student may have the needed intelligence and interest, as do many minority language students, but may lack access and thus be unsuccessful in school. Another student may be highly intelligent and have access to beneficial educational experiences, and yet do poorly in school because of lack of interest. While the three factors can be distinguished for purposes of discussion, they cannot be separated in designing or delivering successful programs.

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